

In the Claims

- 1 10. (Previously Amended) An apparatus for selectively forming a silicide
2 comprising:
3 a semiconductor substrate having a surface, a portion of said surface having
4 silicon thereon and a portion of said surface having an insulator thereon, said
5 surface further having an oxide thereover;
6 a chamber;
7 at least one workpiece holder within said chamber adapted to hold said
8 substrate;
9 at least one pump adapted to evacuate said chamber to maintain a continuous
10 vacuum in said chamber;
11 at least one line operatively connected between said at least one pump and said
12 chamber for evacuating said chamber;
13 at least one input line adapted to provide a chemical agent into said chamber
14 while in said continuous vacuum, said chemical agent adapted to remove
15 said oxide from said surface of said substrate;
16 at least one output line adapted to remove said cleaning agent and said removed
17 oxide from said chamber;

18 a reactor in said chamber, said reactor adapted to deposit a metal onto said
19 silicon and insulator portions on said substrate surface while in said
20 continuous vacuum;

21 a heating element, said heating element adapted to heat said substrate to an
22 elevated temperature to form a silicide on said substrate surface over the
23 silicon portion by reaction with the metal deposited thereon, while the metal
24 remains unreacted over the insulator portion; and

25 an etchant to remove unreacted metal from the substrate surface while leaving
26 said silicide over portions of said semiconductor substrate.

1

1 12. (Previously Amended) The apparatus of claim 10 wherein said chamber
2 comprises a plurality of interior chambers, at least one interior chamber adapted to
3 remove said oxide from said surface of said substrate while under said continuous
4 vacuum, and at least one interior chamber adapted to deposit said metal on said
5 surface of said substrate while under said continuous vacuum.

1 13. (Original) The apparatus of claim 12 further comprising at least one interior
2 chamber adapted to heat said substrate.

1 14. (Previously Amended) The apparatus of claim 12 wherein said apparatus is
2 adapted to transfer said substrate between said interior chamber adapted to remove

3 said oxide from said surface of said substrate and said interior chamber adapted to
4 deposit said metal on said surface of said substrate without breaking said continuous
5 vacuum.

1 15. (Original) The apparatus of claim 14 wherein said substrate is a silicon
2 substrate.

1 16. (Original) The apparatus of claim 15 wherein said apparatus is adapted to
2 remove said oxide from said surface of said substrate using a nitrogen trifluoride
3 cleaning process.

1 17. (Original) The apparatus of claim 16 wherein said metal is cobalt.

1 18. (Original) The apparatus of claim 17 wherein said interior chamber adapted
2 to deposit said metal on said surface of said substrate is a vapor sputtering device.

1 19. (Original) The apparatus of claim 18 wherein said apparatus is further
2 adapted to transfer said substrate to said heating chamber from said metal
3 deposition chamber.

1 20. (Original) The apparatus of claim 19 wherein said silicide is cobalt silicide.

- 1 21. (Previously Added) A system for selectively forming a silicide on a surface of
2 a semiconductor substrate comprising:
3 said semiconductor substrate having said surface, a portion of said surface
4 having silicon thereon and a portion of said surface having an insulator
5 thereon, said surface further having an oxide thereover;
6 a chamber;
7 at least one pump adapted to evacuate said chamber to maintain a continuous
8 vacuum in said chamber;
9 a chemical agent input into said chamber adapted to remove said oxide from
10 said surface of said substrate while said chamber is under said continuous
11 vacuum;
12 a reactor in said chamber, said reactor adapted to deposit a metal onto said
13 silicon and insulator portions on said substrate surface while under said
14 continuous vacuum;
15 a heating element, said heating element adapted to heat said substrate to an
16 elevated temperature to form a silicide on said substrate surface over the
17 silicon portion by reaction with the metal deposited thereon, while the metal
18 remains unreacted over the insulator portion; and
19 an etchant to remove unreacted metal from the substrate surface while leaving
20 said silicide over portions of said semiconductor substrate.

1 22. (Previously Added) The system of claim 21 wherein said chamber comprises
2 a plurality of interior chambers, at least one interior chamber adapted to remove
3 said oxide from said surface of said substrate while under said continuous vacuum,
4 and at least one interior chamber adapted to deposit said metal on said surface of
5 said substrate while under said continuous vacuum.

1 23. (Previously Added) The system of claim 22 wherein said apparatus is
2 adapted to transfer said substrate between said interior chamber adapted to remove
3 said oxide from said surface of said substrate and said interior chamber adapted to
4 deposit said metal on said surface of said substrate without breaking said continuous
5 vacuum.

1 24. (Previously Added) The system of claim 21 wherein said metal is cobalt.

1 25. (Previously Added) The system of claim 21 wherein said chemical agent is
2 selected from the group consisting of nitrogen trifluoride and argon.

1 26. (Previously Added) The system of claim 21 wherein said reactor for
2 depositing said metal on said surface of said substrate is a vapor sputtering device.

1 27. (Previously Added) The system of claim 21 wherein said heating element
2 resides within said chamber.

1 28. (Previously Added) The system of claim 21 wherein said heating element is
2 external thereto said chamber.

1 29. (Previously Added) The system of claim 21 wherein said unreacted cobalt is
2 removed using an etchant comprising hydrogen peroxide and sulfuric acid.

1 30. (Previously Added) An apparatus in combination with a semiconductor
2 substrate for selectively forming a silicide thereon a surface of said semiconductor
3 substrate comprising:

4 a portion of said semiconductor substrate surface having silicon thereon and a
5 portion of said surface having an insulator thereon, said surface further
6 having an oxide thereover;

7 a chamber;

8 at least one workpiece holder within said chamber adapted to hold said
9 semiconductor substrate;

10 at least one pump adapted to evacuate said chamber to maintain a continuous
11 vacuum in said chamber;

12 at least one line operatively connected between said at least one pump and said
13 chamber for evacuating said chamber;
14 at least one input line adapted to provide a chemical agent into said chamber
15 while in said continuous vacuum, said chemical agent adapted to remove
16 said oxide from said surface of said substrate;
17 at least one output line adapted to remove said cleaning agent and said removed
18 oxide from said chamber;
19 a reactor in said chamber, said reactor adapted to deposit a metal onto said
20 silicon and insulator portions on said substrate surface while in said
21 continuous vacuum;
22 a heating element, said heating element adapted to heat said substrate to an
23 elevated temperature to form a silicide on said substrate surface over the
24 silicon portion by reaction with the metal deposited thereon, while the metal
25 remains unreacted over the insulator portion; and
26 an etchant to remove unreacted metal from the substrate surface while leaving
27 said silicide over portions of said semiconductor substrate.